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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/945,553

08/30/2001

Fernando Gonzalez

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12/28/2004

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EXAMINER

FOURSON III, GEORGE R


ART UNIT

PAPER NUMBER

2823

DATE MAILED: 12/28/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/945,553	<b>Applicant(s)</b> GONZALEZ ET AL.	
	<b>Examiner</b> George Fourson	<b>Art Unit</b> 2823	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 14 October 2004.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-66 is/are pending in the application.
- 4a) Of the above claim(s) 2-4, 8, 13, 16, 23-30 and 34-66 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 5, 6, 9-12, 14, 15, 17-22 and 31-33 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |   |   |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)  | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date <u>20040922</u> | 6) <input type="checkbox"/> Other: _____  |

The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1,5,6,9-12,14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of applicant's admitted prior art (AAPA) and Mitani et al.

Applicant admits in the instant specification, pages 1-3, formation of a polycide gate stack followed by patterning and oxidation of the polysilicon portion of the stack. The process of AAPA does not include presence of gaseous  $\text{NF}_3$ .

Mitani et al discloses oxidation of polysilicon gate material in an ambient comprising  $\text{NF}_3$  as a method of introducing F into the channel region of a MOSFET (col.41, lines 12-18).

Mitani et al discloses one aim of the process is introduction of the halogen element contained in the sidewall insulating films formed on the sidewalls of the gate electrode into the gate electrode (col.3, lines 65+) to obtain a desired doping profile in the channel region including a profile in which the F concentration near the edges of the channel region is higher than that in the middle of the channel region (col.42, lines 4+). Also see the 26<sup>th</sup> embodiment (col.41) in which an insulating film is formed on the sidewall of a polysilicon gate electrode by thermal oxidation of polysilicon in the presence of  $\text{NF}_3$  to introduce F into the channel region of a FET.

It would have been within the scope of one of ordinary skill in the art to combine the teachings of AAPA and Mitani et al to enable the oxidation step of AAPA to be performed and further to achieve the introduction of F according to the teachings of Mitani et al to achieve a desired profile of F in the channel region of the resulting MOSFET. The presence of the metal restricting oxidation of the top surface of the

Art Unit: 2823

poly region would be understood by one of ordinary skill in the art to result in the profile in which the F concentration is higher at the edges than in the middle of the channel region.

Applicant's argument that in the process of Mitani et al the gate structure does not contain metal is addressed in the statement of the rejection above.

Claims 17 and 18-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Mitani et al as applied to claims 1,5,6,9-12,14 and 15 above, and further in view of Cunningham.

AAPA in combination with Mitani et al does not include sidewall formation or metal nitride barrier layer formation.

Cunningham discloses sidewall formation after polysilicon oxidation and metal nitride barrier layer formation in a polycide gate formation process (abstract and [0030]).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of AAPA, Mitani et al and Cunningham to enable the polycide gate structure of AAPA to be formed according to the teachings of Cunningham related to obtaining greater tolerance to higher temperature annealing.

Claims 31-33 are rejected under 35 U.S.C. 103(a) as being unpatentable over AAPA in combination with Mitani et al as applied to claims 1,5,6,9-12,14 and 15 above, and further in view of Jain et al.

AAPA and Mitani et al do not disclose presence of  $\text{NF}_3$  during gate patterning.

Jain et al discloses patterning of layers to form a polycide gate electrode using  $\text{NF}_3$  gas (col.2, lines 13-22).

It would have been within the scope of one of ordinary skill in the art to combine the teachings of AAPA, Mitani et al and Jain et al to enable the step of patterning the gate stack of AAPA to be performed and furthermore to enable removal of the ARC as disclosed by Jain (see abstract).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group Receptionist whose telephone number is (703) 308-0956 until 2/4/04. See MPEP 203.08.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to examiner George Fourson whose telephone number is (571)272-1860. The examiner can normally be reached on Monday through Friday.

Art Unit: 2823

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri, can be reached on (571)272-1855. The fax number for this group is (571)273-0224 and the customer service number for group 2800 is 571-272-2800. Updates can be found at <http://www.uspto.gov/web/info/2800.htm>.



George Fourson  
Primary Examiner  
Art Unit 2823

GFourson  
December 22, 2004